CLAIMS

What is claimed is:

1. An equalizer comprising:

a first port for launching a beam of light comprising multiple wavelengths;

a dispersive element having a concave surface for dispersing the beam of light into a plurality of sub-beams of light and for focusing each sub-beam of light onto a focal plane thereof; and,

a modulator array disposed substantially at the focal plane for receiving the plurality of sub-beams of light and for directing them back to the dispersive element.

2. The equalizer of claim 1, wherein the dispersive element is an aberration corrected concave diffraction grating.

3. The equalizer of claim 2, wherein the modulator array comprises one of a liquid crystal array, a polymer dispersed liquid crystal array, and a MEMS array.

4. The equalizer of claim 3, wherein the modulator array includes a concave surface.

5. The equalizer of claim 4, wherein each modulator of the modulator array is disposed about the concave surface of the modular array to direct the plurality of sub-beams of light back to the diffraction grating.

6. The equalizer of claim 4, wherein the concave surface of the modulator array comprises a concave mirror filled with a polymer dispersed liquid crystal.

7. The equalizer of claim 4, wherein the concave surface of the modulator array has a radius of curvature approximately equal to a focal length of the diffraction grating.

8. The equalizer of claim 3, wherein the modulator array includes a convex surface.

9. The equalizer of claim 3, wherein the first port is optically coupled to a thermally expanded core optical fiber.

10. The equalizer of claim 3, wherein the first port is coupled to an optical circulator.

11. The equalizer of claim 3, comprising a fold mirror for directing a beam of light transmitted from the diffraction grating to a second port spatially displaced from the first port.

12. The equalizer of claim 11, wherein the first and second ports are optically coupled to input and output waveguides.

13. The equalizer of claim 12, wherein the input and output optical waveguides include thermally expanded core fibers.

14. An equalizer comprising:

a first port for launching a multiplexed beam of light;

an aberration corrected diffraction grating having a concave surface for spatially dispersing the multiplexed beam of light into a plurality of sub-beams of light and focusing each sub-beam of light onto a focal plane thereof;

a modulator array disposed substantially at the focal plane for selectively attenuating each sub-beam of light and reflecting each sub-beam of light back to the diffraction grating for recombination into a single beam of light; and

a second port for receiving the single beam of light.

15. The equalizer of claim 14, wherein the modulator array is designed to reflect each sub-beam of light back to the diffraction grating at approximately a same position that it was diffracted from.

16. The equalizer of claim 15, wherein the modulator array comprises means for controlling a position of light reflection on the diffraction grating.

17. The equalizer of claim 15, wherein the first and second ports correspond to first and third ports of a three port optical coupler.

18. A method of attenuation comprising the steps of:

launching light having multiple wavelength signals;

diffracting the light and focusing the diffracted light onto a modulator array using a concave diffraction grating; and

reflecting the light back to the concave diffraction grating.

19. The method of claim 17, wherein the step of reflecting the light back to the concave grating comprises using at least one of a micro-electrical-mechanical array, a polymer dispersed liquid crystal array, a concave surface, and a convex surface.

20. The method of claim 19, wherein the step of launching light comprises using a thermally expanded core fiber.